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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,165	10/06/2003	Takeshi Masamitsu	402817	5719

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EXAMINER	
PAREKH, NITIN	
ART UNIT	**PAPER NUMBER**
2811	

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/678,165	MASAMITSU ET AL.
	Examiner	**Art Unit**
	Nitin Parekh	2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The Information Disclosure Statement filed on has been considered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 5-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Den (see IDS reference- Japaneses Pat. No. 05-109707).

Regarding claims 5-7, Den discloses a semiconductor device comprising:

- a substrate (5 in Fig. 1)
- a metal wiring (6 in Fig. 1) formed on a substrate
- a buffer layer (1 in Fig. 1) formed so as to cover the metal wiring, the buffer layer comprising a silicon nitride (SiN) film having a thickness of about 100 nm (see English translation including Abstract/Constitution), and

- an interlayer insulating/passivating films (see 4 and 3 in Fig. 1) formed on the buffer layer by a conventional CVD and plasma growth/CVD methods respectively

(Fig. 1; See English Translation: Abstract/Constitution).

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Van Ngo et al. (US Pat. 6492258).

Regarding claim 1, Van Ngo et al disclose a semiconductor device comprising:

- a substrate (14 in Fig. 2)
- a metal/aluminum (Al) wiring (22 in Fig. 2) formed on the substrate and covered with the films of a high-melting-point metal such as titanium/titanium alloy immediately above and below (see 12 and 18/25 in Fig. 2), and

- an interlayer dielectric/insulating film/IDL being formed by a conventional high density plasma (HDP) deposition/CVD method (Col. 5, line 10) so as to as to cover the metal wiring

(Fig. 1 and 2; Col. 4 and 5)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

7. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Ngo et al. (US Pat. 6492258).

Regarding claim 1, forming the interlayer insulating film (IIL) do not distinguish over Van Ngo et al., because only the final product/structure is relevant, not the process of forming the IIL such as subjecting to “plasma CVD“ or “CVD” or “sputtering”. Note that a “product by process” claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not . Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Den (see IDS reference- Japanese Pat. No. 05-109707).

Regarding claim 5, forming the interlayer insulating film (IIL) do not distinguish over Den, because only the final product/structure is relevant, not the process of forming the IIL such as subjecting to "plasma CVD" or "CVD" or "sputtering". Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not . Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Ngo et al. (US Pat. 6492258) in view of Yamazaki et al. (US Pat. 5929527).

Regarding claim 2, Van Ngo et al. teach substantially the entire claimed structure as applied to claim 1 above, except an Al compound layer being formed on the side of the wiring.

Yamazaki et al. teach having Al wiring/metallization where the sides of patterned Al layer (106 in Fig. 1C) has a layer of an Al compound such as aluminum oxide (see 108 and 109 in Fig. 1C to provide the desired surface protection, improved heat resistance and reduced thermal stress/defects (Col. 3, lines 40-50; Col. 3-10).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the layer of the Al compound on the sides of the wiring as taught by Yamazaki et al. so that the heat resistance can be improved and the thermal stress related defects can be reduced in Van Ngo et al's device.

Regarding claim 2, forming the interlayer insulating film (IIL) do not distinguish over Van Ngo et al. and Yamazaki et al., because only the final product/structure is relevant, not the process of forming the IIL such as subjecting to "plasma CVD" or "CVD" or "sputtering". Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not . Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

10. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Ngo et al. (US Pat. 6492258) and Yamazaki et al. (US Pat. 5929527). as applied to claim 2 above, and further in view of Cobral, Jr. et al. (US Pat. 5625233).

Regarding claims 3 and 4, Van Ngo et al. Yamazaki et al. teach substantially the entire claimed structure as applied to claim 2 above, except the Al compound layer is subjected to annealing in a nitrogen (N2) or an oxygen (O2) atmosphere to nitrogenize or oxidize the side of the Al wiring respectively.

Cobral, Jr. et al. teach a conventional annealing processes using N2 or O2 anneal to nitridize/nitrogenize or oxidize the Al surface respectively (Col. 3, lines 35-55; Col. 4, lines 23-50; Col. 6, line 38) to prevent mechanical and electrical degradation of the metallization (Col. 3-6).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate processing/annealing in a nitrogen (N2) or an oxygen (O2) atmosphere to nitogenize or oxidize the side of the Al wiring respectively as taught by Cobral, Jr. et al. so that thermal stress related defects can be reduced and electrical performance can be improved in Yamazaki et al. and Van Ngo et al's device.

Regarding claims 3 and 4, nitrogenizing or oxidizing the Al wiring do not distinguish over Van Ngo et al., Yamazaki et al. and Cobral, Jr. et al., because only the final product/structure is relevant, not the process of nitrogenizing or oxidizing such as subjecting to “annealing“ or “radiation” or “plasma atmosphere”. Note that a “product by process” claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ

324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not . Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 571-272-1663. The examiner can normally be reached on 09:00AM-05:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Nitin Parekh

Nitin Parekh

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06-26-04